PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of
Minoru MIYATAKE, et al.

Docket No: Q57340

Appln. No.: 09/468,085

Group Art Unit: 2871

Confirmation No.: 3194

Examiner: David Y. Chung

19 #/Appeal Brief 2/27/04

Filed: December 21, 1999

For: LIGHT DIFFUSING PLATE, OPTICAL ELEMENT, AND LIQUID-CRYSTAL DISPLAY

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 1.192, Appellants submit the following:

I. REAL PARTY IN INTEREST

The real party in interest is the Assignee, Nitto Denko Corporation, of Japan, by virtue of an assignment as recorded in the US Patent & Trademark Office at reel 010508, frame 0423.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, the Appellants' legal representative, or Assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1, 2, and 5-13 are pending, are rejected, and are the subject of this appeal.

Claims 3 and 4 have been canceled from this application.

IV. STATUS OF AMENDMENTS

On September 23, 2003, Applicants filed a response, which was filed after the Final Office Action mailed on April 23, 2003. But the September 23 response did not make any amendments to the claims. Accordingly, the claims stand as presented before the April 23 Final Office Action.

V. SUMMARY OF THE INVENTION

The presently claimed invention relates to a light diffusing plate which has anisotropy in the scattering of linearly polarized light, is highly effective in diffusing the directions of the scattering thereof, and is suitable for use in, for example, improving the perceptibility, brightness, and other performances of liquid crystal displays and the like.[1]

A light diffusing plate of the present invention comprises a birefringent film 1 containing dispersed therein minute regions (e) different from the birefringent film 1 in birefringent characteristics. See, for example, Figs, 1 and 2. The minute regions comprise a thermoplastic liquid-crystal polymer. The difference in refractive index between the birefringent film and the minute regions in a direction perpendicular to the axis direction in which a linearly polarized light has a maximum transmittance, Δn^1, is 0.03 or larger and that in said axis direction, Δn^2, is not larger than 80% of the Δn^1 direction.[2]

In the light diffusing plate of the presently claimed invention, the minute regions and the matrix dispersedly containing the same are made of a polymeric material. Consequently, the light diffusing plate not only is excellent in raw-material handleability and ease in producibility but has excellent stability of optical functions and excellent suitability for practical use due to its thermal and chemical stability of those materials. Furthermore, in the axis direction (Δn^2 direction) in which a linearly polarized light has a maximum transmittance, the linearly polarized

[1] Specification at page 1, lines 6-11.

[2] Specification at: page 3, lines 8-16; page 6, lines 9-17; page 6, line 24 - page 7, line 7; page 14, lines 8-17.

light passes through the diffusing plate while satisfactorily retaining its polarized state. In directions (Δn^1 directions) perpendicular to the Δn^2 direction, the linearly polarized light is scattered based on the difference in refractive index Δn^1 between the birefringent film and the minute regions, whereby the polarized state is diminished or eliminated.[3]

In the birefringent film, the minute regions are preferably dispersed and distributed as evenly as possible from the standpoints of homogeneity in the aforementioned scattering effect, etc. The size of the minute regions, especially the length thereof in Δn^1 directions, which are directions of scattering, relates to backward scattering (reflection) and wavelength dependence.[4]

On one hand, from the standpoint of inducing and enhancing backward scattering, it is preferred to regulate the Δn^1-direction diameter of the minute regions to a size which causes Rayleigh scattering, that is, to a size sufficiently smaller than the wavelengths of the light to be used. On the other hand, from the standpoint of diminishing the wavelength dependence of scattered light, the Δn^1 direction size of the minute regions is preferably as large as possible, although this adversely influences the above-described inhibition of backward scattering.[5]

From the standpoints of the above-described inhibition of backward scattering and wavelength dependence, etc. and, hence, from the standpoints of improving the efficiency of light utilization, preventing coloration due to wavelength dependence, preventing the minute regions from being visually perceived to impair bright displaying, and attaining satisfactory film-forming properties and film strength, etc., the size of the minute regions in terms of the Δn^1 direction length thereof is preferably from 0.05 to 500 μm, more preferably from 0.1 to 250 μm, most preferably from 1 to 100 μm.[6]

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[3] Specification at page 4, lines 5-19.

[4] Specification at page 15, lines 10-16.

[5] Specification at page 15, lines 17-25.

[6] Specification at page 16, lines 1-10.

The above constitution therefore brings about an increase in the amount of linearly polarized light passing through the polarizing plate, and this effect functions like the reduction of absorption loss to attain an improvement in the brightness of transmission-type liquid-crystal displays or the like.[7]

Furthermore, the above constitution is less apt to pose certain problems, whereby it can be easily applied also to reflection-type liquid-crystal displays. Thus, a liquid-crystal display excellent in brightness and perceptibility can be obtained at low cost.[8]

VI. ISSUES

1) Whether claims 1, 2, and 5-13 are unpatentable under §103(a) over US Patent 5,825,543 to Ouderkirk et al.

VII. GROUPING OF CLAIMS

With respect to issue 1:

claims 1, 5, and 7-13 stand or fall together; and

claims 2 and 6 stand or fall together, but do so separately from claims 1, 5, and 7-13.

VIII. ARGUMENTS

The Examiner rejected claims 1-13 [read 1, 2, and 5-13] under §103(a) as being unpatentable over US Patent 5,825,543 to Ouderkirk et al. (hereinafter Ouderkirk). Applicants respectively traverse this rejection because Ouderkirk fails to teach or suggest all the elements as set forth in the claims, and there is no motivation to modify Ouderkirk as suggested by the Examiner.

First, Ouderkirk fails to teach or suggest all the elements as set forth in the claims.

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[7] Specification at: page 5, lines 4-8; page 25, line 2 - page 27, line 18.

[8] Specification at page 5, lines 9-14.

Claim 1 sets forth a light diffusing plate comprising a birefringent film containing dispersed therein minute regions differing from the birefringent film in birefringent characteristics, wherein a difference in refractive index between the birefringent film and the minute regions in a direction perpendicular to an axis direction in which a linearly polarized light has a maximum transmittance, Δn^1, is 0.03 or larger, and further wherein the minute regions are dispersedly contained in the birefringent film by phase separation and each has a length in the Δn^1 direction of from 0.05 to 500 μm.

In contrast to that in claim 1, Ouderkirk fails to teach or suggest Applicants' claimed length of the particles in the Δn^1 direction of from .05 to 500 μm. Instead, Ouderkirk discloses that the length of the particles is greater than the wavelength of electromagnetic radiation of interest divided by 30, and that through the specification the wavelength of interest is that of the visible spectrum. See: col. 9, lines 28-67; and col. 15, lines 1-7. Accordingly, because the wavelength of the visible spectrum ranges from .430 μm to .690 μm, the length of Ouderkirk's particles is greater than .0143 to .0231 μm. But Ouderkirk does not disclose an upper limit on the length of the particles. Accordingly, Ouderkirk's range of particle length overlaps that set forth in claim 1.

But Applicants have disclosed the importance of their claimed range. That is, as set forth on page 15, line 13 to page 16, line 10, the claimed range is the result of balance between achieving backward scattering and diminishing the wavelength dependence of scattered light. That is, in order to induce and enhance backward scattering, it is preferred to regulate the Δn^1 direction diameter of the minute regions to a size which causes Rayleigh scattering, that is, to a size sufficiently smaller than the wavelengths of the light to be used. On the other hand, in order to diminish the wavelength dependence of scattered light, the Δn^1 direction size of the minute regions is preferably as large as possible. Accordingly, the claimed range represents a tradeoff in these considerations.

And a *prima facie* case of obviousness based on overlapping ranges can be overcome by showing the criticality of the claimed range. Accordingly, because Applicants have shown the criticality of their claimed range, this rejection should be withdrawn.

Further, however, the Examiner makes the bald assertion that "[t]he range claimed by Applicant for the length of the dispersed liquid crystal polymer particles is very broad and virtually non-limiting. The length of conventional liquid crystal polymer particles is well within this range."[9] It thus appears that the Examiner tries to take official notice of the length of the liquid polymer crystals. Accordingly, Applicants respectfully request that the Examiner come forward with evidence to support this assertion. That is, an Examiner may not rely on official notice, or judicial notice, or a mere statement of obviousness at the exact point where patentable novelty is argued, but must come forward with pertinent prior art. See *Ex parte Cady*, 148 U.S.P.Q. 162 (Bd. of App. 1965).

For at least any of the above reasons, Ouderkirk fails to render obvious Applicants' claim 1. Likewise, this reference fails to render obvious dependent claims 2 and 5-13. However, Applicants respectfully traverse this rejection as it applies to claims 2 and 6 for the following additional reasons.

With respect to claims 2 and 6, there is no motivation to combine the references as suggested by the Examiner. That is, the Examiner asserts that the chemical composition of the thermoplastic liquid crystal polymer is "well known and obvious for showing liquid crystal characteristics".[10] However, a statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte*

[9] Final Office Action mailed on April 23, 2003, at the paragraph bridging pages 2 and 3 at lines 8-11.

[10] April 23 Final Office Action at page 2, last 4 lines.

Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). Here, the Examiner asserts that because liquid crystal polymers are well known, it would have been obvious to use such a material in Ouderkirk. However, the Examiner provides no motivation for doing so.

Second, the Examiner's interpretation of Ouderkirk is mistaken. In the Advisory Action mailed on December 12, 2003, the Examiner asserts that Ouderkirk teaches "in applications where the disclosed optical body is to be used as a diffusely reflecting polarizer, the dispersed phase particles will have a length that is greater than about 2 times the wavelength of the electromagnetic radiation over the wavelength range of interest, and preferably over 4 times the wavelength." The Examiner cites to Ouderkirk's col. 9, lines 55-59. However, the lines cited by the Examiner do not refer to a "diffusely reflecting polarizer" but, instead, refer to a **reflective polarizer**.

That is, Ouderkirk discloses the following embodiments: 1) a diffusely reflective film, col. 3, line 60 - col. 4, line 30; 2) a diffuse reflective polarizer, col. 3, lines 31-47; and 3) a reflective polarizer with a high extinction ratio, col. 3, lines 48-57. But Ouderkirk's embodiment 1 corresponds to diffusing reflector 6 as in Fig. 4 of the present specification, and Ouderkirk's embodiments 2 and 3 correspond to either one of polarizing plates 4, 41, as in Figs. 4 and 5, whereas the claimed invention is directed to light diffusing plate 1 as shown in Figs. 1-5 of the present specification. In fact, in the passage relied upon by the Examiner, Ouderkirk specifically states that "in applications where the optical body is to be used **as a low loss reflective polarizer**, the particles will have ..."[11] Accordingly, the passage cited by the Examiner corresponds to Ouderkirk's embodiment 3, i.e., to either of the polarizing plates 4 and 41 as shown in Figs. 4 and 5 of the present specification. Thus, the passage relied upon by the Examiner does not refer to Ouderkirk's diffusely reflecting polarizer embodiment as he suggests. Accordingly, one of ordinary skill in the art following the teachings of Ouderkirk would not have

[11] Ouderkirk at col. 9, lines 55-59.

been motivated to make the length of the particles in the Δn^1 direction, in a light diffusing plate, of from .05 to 500 μm, as set forth in claim 1.

Third, Applicants respond to the Examiner's remarks as set forth in the "Response to Arguments" section of the April 23 Final Office Action, as set forth on page 3 therein.

Although the Examiner's statement of the rejection itself is the same as in the previous Office Action, he now makes remarks concerning newly cited US Patent 5,995,183 to Tsuyoshi. But Tsuyoshi is not part of the stated rejection. If the Examiner chooses to rely on the teachings as set forth in Tsuyoshi, then he should make that reference part of the stated rejection. Because Tsuyoshi is not part of the stated rejection, Applicants are under no obligation to comment as to its specific teachings.

Nonetheless, one of ordinary skill in the art would not even take Tsuyoshi's teachings into account when considering Ouderkirk and the presently claimed invention. That is, Tsuyoshi's Tables 1-4 set forth sizes of titanium oxide particles, whereas Table 5 sets forth sizes of glass, aluminum borate, and silicon carbide/nitride particles. And none of these particle types are liquid-crystal polymers as set forth in claim 1, or the crystalline polymeric materials disclosed in Ouderkirk. See Ouderkirk at col. 12, line 50 *et seq.*, especially col. 13, 1st and 2nd full paragraphs. Accordingly, the Examiner's assertion that Tsuyoshi discloses typical light-scattering particle sizes has no bearing on Applicants' claimed liquid-crystal polymer minute regions, and does not teach one of ordinary skill in the art what particle sizes to use within the bounds of Ouderkirk's teachings.

In light of the above, the Examiner still has failed to present any teaching or suggestion of a light diffusing plate comprising a birefringent film containing dispersed therein minute regions differing from the birefringent film in birefringent characteristics, wherein the minute regions comprise a thermoplastic liquid-crystal polymer and have a length in a Δn^1 direction of from 0.05 to 500 μm, as set forth in Applicants' claim 1.

Further, the Examiner asserts that "[i]t would be an absurdity for a light-diffusing layer to have particles with a length larger than 500 μm because these particles would be visible to the

naked eye."[12] But whether the particles would be visible to the naked eye is not the test for obviousness. Moreover, the Examiner's assertion relies on the mistaken underlying assumption that the particles are opaque. Instead, claim 1 sets forth that the minute regions are comprised of thermoplastic liquid-crystal polymer and, therefore, are translucent.

For at least any of the above reasons, Ouderkirk still fails to render obvious Applicants' claims 1, 2, and 5-13. Therefore, this rejection is believed to be in error and should be withdrawn.

Conclusion

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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[12] April 23 Final Office Action at page 3, lines 12-13.

APPENDIX

Claims 1, 2, and 5-13:

1. A light diffusing plate comprising a birefringent film containing dispersed therein minute regions differing from the birefringent film in birefringent characteristics,

wherein the minute regions comprises a thermoplastic liquid-crystal polymer, and difference in refractive index between the birefringent film and the minute regions in a direction perpendicular to an axis direction in which a linearly polarized light has a maximum transmittance, Δn^1, is 0.03 or larger and that in said axis direction, Δn^2, is not larger than 80% of the Δn^1, and

further wherein the minute regions are dispersedly contained in said birefringent film by phase separation and each has a length in the Δn^1 direction of from 0.05 to 500 μm.

2. A light diffusing plate according to claim 1, wherein said thermoplastic liquid-crystal polymer is a thermoplastic branched liquid-crystal polymer having side chains each containing a segment represented by general formula (I): -Y-Z, wherein Y is one of a polymethylene chain, a polyoxymethylene chain and a polyoxyethylene chain branching from a main chain and Z is a para-substituted cyclic compound.

5. A light diffusing plate according to claim 1, wherein two or more birefringent films which are superposed on each other so that the Δn^1 directions of each of the birefringent films are parallel to those fro one or two of the adjacent layer.

6. A light diffusing plate according to claim 2, wherein two or more birefringent films which are superposed on each other so that the Δn^1 directions of each of the birefringent films are parallel to those fro one or two of the adjacent layer.

7. A light diffusing plate according to claim 3, wherein two or more birefringent films which are superposed on each other so that the Δn^1 directions of each of the birefringent films are parallel to those for one or two of the adjacent layer.

8. A light diffusing plate according to claim 2, wherein two or more birefringent films are superposed on each other so that the Δn^1 directions of each of the birefringent films are parallel to those for one or two of the adjacent layer.

9. An optical element comprising a multilayer structure which comprises the light diffusing plate of any one of claims 1 to 8 and at least one of a polarizing plate and a phase plate.

10. An optical element according to claim 9, wherein a transmission axis of the polarizing plate is parallel to the Δn^2 direction for the light diffusing plate.

11. A liquid-crystal display comprising a liquid-crystal cell and disposed on one or each side thereof the light diffusing plate of any one of claims 1 to 8.

12. A liquid-crystal display comprising a liquid-crystal cell and disposed on one or each side thereof the optical element of claim 9.

13. A liquid-crystal display comprising a liquid-crystal cell and disposed on one or each side thereof the optical element of claim 10.